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INTERNATIONAL RELATIONS IN SCIENCE[1]

IN this my introductory lecture, I take pleasure, at the very outset, in expressing my gratitude to the president of your university, to Professor Dennis and to the other authorities responsible for having addressed to me an invitation to come to you as lecturer on the Baker Foundation. I regard this invitation as a great honor, altogether beyond what I have deserved, and it will be my earnest endeavor, during my stay in your midst, to discharge the duties of this lectureship to the utmost of my ability.

The first of these duties in point of time is to deliver an introductory lecture on a non-technical subject. The choice of such a subject for the present occasion has caused me not a little difficulty. At the outset it seemed to me that since the purpose of the Baker Foundation is to bring over lecturers from other lands and thus facilitate intercourse between workers of different nationalities, I might perhaps suitably discuss the nature and extent of the intercourse between scientific men in different countries, both in the past and in the present. When I mentioned my plan to a friend who had lectured in a western university, he told me that the relations between European scientists would not be of any particular interest here, where a single nation stretches right across a continent. He further suggested that Americans are not so well informed about the national peculiarities of Europeans as I imagined, that they have no sympathy for our difficulties and are indeed somewhat impatient of European squabbles and jealousies. I was advised to discuss instead some more concrete chapter in scientific research and to treat it in a popular fashion. This suggestion, that America stands aloof from European affairs, did not, however, agree with my own impressions, previously gathered from American colleagues visiting Europe. The very fact that your university makes a practice of inviting foreign lecturers and the assurances of two of my predecessors in the Baker lectureship, convinced me that here in the east, at any rate, you are not only well acquainted with conditions in Europe, but also understand our difficulties, so that I still hope I may bring before you certain general considerations affecting scientific progress, and thus discharge my obliga-

[1] Introductory public lecture by Professor George Barger, of the University of Edinburgh, non-resident lecturer in chemistry at Cornell University.

tion, without discussing in detail any particular line of research.

Apart from its effect on the progress of science, the intercourse which I propose to discuss may contribute largely to the mutual understanding of nations. If the consent of scientific men, instead of that of parliaments, were required for the making of wars, the peace of the world would not indeed be assured, but I venture to think—I certainly hope—that it would be less precarious than it is at present. Scientific research is one of the most international forms of human endeavor. Perhaps it might be considered second to music in this respect, since music is independent of human speech; we can enjoy the compositions of foreign composers without knowing their mother tongue. Yet for this very reason music does not greatly help us to understand other nations and the music of the east may even be unintelligible to the west. Athletic contests and games like chess bring about the meeting of competitors from distant lands, but these international competitions affect only a handful of champions. The Olympic games no longer bring together the nations of the modern world as they united the communities of ancient Greece. But scientific phenomena are universal; they are the same all the world over. How often does the specialist worker remain isolated in his own country and find that his particular field is only cultivated by workers abroad! My further lectures will furnish many examples of this, as indeed all scientific lectures are apt to do. Let me, for the purposes of the present occasion, anticipate. The intense physiological action of extracts of the adrenal gland was discovered by two Englishmen and practically at the same time by two Poles. The isolation of epinephrin was then attempted by an Irishman and by an Austrian; it was accomplished in the United States by one of your countrymen and by a Japanese. The substance was next investigated by a Frenchman, an Englishman and by several Germans, one of whom synthesized it; it was also synthesized by an Englishman. Allusion to this chain of researches, extending over less than a decade, has already involved me in the mention of eight nationalities. Hence it is clear that international relations play a considerable part in scientific research.

Western science originated with the Greeks and in the Hellenistic period became concentrated at Alexandria; other civilizations, such as that of the Chinese, remained isolated, and facts known to them were rediscovered later in the west. In ancient times there was a good deal of intercourse among philosophers all round the eastern half of the Mediterranean. Already the Ionian Greeks of the fifth century B. C. were characterized by a love of travel for the sake of the "wonders" to be seen in strange lands. Thales (624–547 B. C.), the founder of Greek geometry and of Greek astronomy, traveled in Egypt, and Pythagoras also undertook extensive journeys. Mathematical discoveries, whether made in Asia Minor, in the east or in Magna Graecia in the west, became widely known by an intercourse facilitated by a common language and apparently not hampered greatly by political differences or even by wars; yet the harmful effect of war on scientific progress was early illustrated by the killing of Archimedes by a Roman soldier at the sack of Syracuse in 212 B. C.

The decay of the Roman empire was accompanied by that of Greek science, which passed at a later period to the Moors. Not until the Renaissance did the pursuit of science spread to the nations of the west, and then, for a time, it would seem to have been more international than other forms of human activity. In the school of medicine at Salerno and the earliest universities of Bologna, Padua and Paris, the universal use of Latin established a freemasonry among the learned, where accidents of nationality did not count and difficulties of communication were overcome. Vesalius, a Belgian, taught anatomy at Padua, Paracelsus traveled widely in troublous times, and science appeared wholly dissociated from politics. Although Spain was the chief nation concerned in the discovery of America, Columbus was an Italian, and the name of your continent is likewise of Italian origin.

The number of foreign students in medieval universities was great. A document of the year 1228, exactly seven hundred years ago, records the presence at Padua of French, English, Norman, Provençal, Spanish and Catalan students. This was only six years after the foundation of that university. Later the number of foreigners increased still further. They came "non ex propinquis tantum regionibus, non ex ultima solum Italia, sed . . . ex toto prope terrarum orbe." Ultimately twenty-two "nations" were represented, ten from beyond the Alps, twelve from various regions of Italy. Each "nation" elected one or more councilors who assisted the rector in the government of the university. Traces of this divisional arrangement of the students survive in certain Scottish universities. In the fifteenth century there were about a hundred French students at Padua, nearly as many English and Scottish, and over three hundred German. Even now the crests of students from many nations (that of Harvey among the number) may be seen in the old loggia and aula of Padua University and afford interesting testimony to the international character of medieval learning. Professorships were not infrequently held by foreigners;

It is early recorded that the highest office of the university, the rectorship, was held by a Pole in 1271.

At first the study of science was the work of a few devotees who communicated their discoveries by personal intercourse or in the form of books. To these men science was a passion or an obsession, in any case their main interest in life. In course of time the amateur also made himself felt. Otto von Guericke, burgomaster of Magdeburg, was presumably as much occupied with civic affairs as with his air pump; although King Charles II of England founded the Royal Society and sometimes attended its meetings, his main interest can not be said to have been scientific. The diaries of Pepys and of Evelyn give an interesting sidelight on the attitude towards science of the amateur of that period. One of your earliest statesmen, Benjamin Franklin, was distinguished for his important contributions to natural knowledge. Priestley, one of the discoverers of oxygen, was in later life much more interested in theology than in the constituents of the atmosphere. The importance of the work of amateurs, or at least of men not holding official positions, seems to me to have been specially characteristic of British science; I need only mention the names of Boyle and of Cavendish, both scions of noble houses, and of Joule, a brewer.

The growing interest in science led, in the second half of the seventeenth century, to the foundation of societies and academies, who published short communications in their proceedings. The Royal Society of London received its charter in 1662 and arose out of informal earlier meetings at Oxford. Its "Philosophical Transactions" were first published in 1665. About the same time were founded the Accademia del Cimento of Florence (1657), the Academy of Vienna (1652) and the Académie Royale of Paris (1666); the memoirs of the latter began in 1699; in 1700 the Berlin Academy was founded. At first the publications of these various societies preserved the appearance of private intercourse, for they frequently were in the form of letters addressed to the secretary. As an example I may refer to the important microscopic discoveries of Anthoni van Leeuwenhoek, who during the latter years of the seventeenth century wrote several hundred letters from his sleepy little town of Delft to the secretary of the newly founded Royal Society of London; a portion of these letters, published in Dutch, occupies four large volumes. Leeuwenhoek, employed as janitor at the town hall, became, in his spare time, an expert in the grinding of lenses and made his own very powerful simple microscopes, tiny instruments compared with the compound microscopes of a later date. His equipment was indeed in strange contrast to that of the chemical laboratory of this university, which, I understand, has a special section devoted to the application of the microscope to chemistry. Yet Leeuwenhoek's discoveries were of a fundamental kind; thus he first saw and figured infusoria and spermatozoa, and investigated the process of reproduction in various animals. Another famous microscopist of that time, Malpighi, an Italian, also communicated his discoveries to the Royal Society; his original letters, with those of Leeuwenhoek, form an interesting part of the archives of the society.

One of the effects of the foundation of national academies was an increased use of the native tongue in scientific communications, and instead of, or in addition to Latin, it has now become necessary for the man of science to know several modern languages. The abandonment of Latin as the universal language proved an obstacle to scientific intercourse. When lectures at the universities were no longer given in Latin, it became more difficult to obtain teachers from abroad. The change made itself felt in the beginning of the eighteenth century. In the middle of the previous one it was still possible to call to Leiden a Hanoverian physician, Franciscus Sylvius, to teach chemistry and medicine; he indeed founded there the first university chemical laboratory, a humble precursor of the magnificent building in which we are now assembled. When later, early in the eighteenth century, the school of medicine, to which I myself belong, was developed at Edinburgh, the use of spoken Latin, which, as we have seen, had done so much for the medieval universities, had declined, the teachers were all Scotsmen, who had indeed been influenced by the great Boerhaave, of Leiden, but did not use Latin to any large extent in their own lectures. As a written language Latin survived to a much later date, particularly in academic publications, such as doctoral theses which at Edinburgh, for instance, continued to be in Latin until about one hundred years ago; in Germany Latin was still employed for this purpose until about the middle of the last century. To-day the use of Latin in scientific publications is rare and almost restricted to a few botanical and zoological works of reference chiefly of interest to the systematist. Its use as a spoken language is extremely rare; apart from ceremonial occasions at the older English universities, I have myself heard it only twice at international gatherings; on both occasions it was used by Swedes.

The use of the vernacular instead of Latin caused at least a relative setback in the intercourse between the scientific men of various nations. The growth of nationalism in the nineteenth century acted in the same direction, and it was not until travel had been facilitated through the spread of railways that the abandonment of Latin as a universal language was

compensated for by the greater ease of communication.

In giving facilities to advanced students from abroad, for some time Paris and later on the German universities took a leading part and thus contributed greatly to the furtherance of international relations, not the least by spreading a knowledge of French and German among scientific men. Thus the laboratory of Wurtz attracted many foreign chemists to Paris, as did that of Liebig to Giessen. The Pasteur Institute later drew bacteriologists to Paris and towards the end of the century it became comparatively common, particularly for American and English scientific men, to spend a year or so in research at a foreign university. They thus acquired a knowledge of the spoken language, which sometimes proved useful in strange circumstances. When, as the result of the Armistice, the allied chemical experts inspected certain German chemical factories, which had been used for the production of munitions of war, there was at least one occasion when an English and a French chemist met a German expert and the victors had to speak the language of the vanquished, for German was the only language known to all. Personally, I remember a chemical congress held a few years after the war, at Cambridge. England and France were largely represented; there were no Germans; there was a distinguished chemist from Japan who had studied in Germany and spoke its language fluently, but did not speak French. I took pleasure in introducing him in German to his French colleagues who too spoke that language fluently, and later admitted to me privately that it was a very useful one.

Among the advantages of foreign study may therefore be counted the acquisition of a thorough knowledge of a foreign language and some insight into the character of another nation. For various reasons residence abroad has however of late become less frequent, at least relatively so. The great development of your own universities has diminished the inducement to your students to spend some years in Europe, when they find at home an extensive choice of distinguished teachers and of excellent laboratories. The late war has had a great effect in the same direction, particularly on the younger workers in my own country. Formerly it was common for British students to spend a year or two at a German university, in order to obtain the degree of doctor of philosophy, but as a result of the late war practically all British universities have copied Germany in instituting such a degree; the effect has certainly been good in stimulating research among British students at home, but it has also tended to make the younger generation more insular and less acquainted with foreign life and thought. To some extent this is compensated for by the increased number of traveling fellowships, mostly founded by Americans; to these I will refer later.

We have seen that the disuse of Latin as a vehicle of instruction made the occupation of teaching posts by foreigners more difficult, but the practice has never died out. Thus in 1845 Prince Albert, the Consort of Queen Victoria, and a German who did much to stimulate scientific research in his adopted country, secured the migration to London of A. W. Hofmann. The nineteen years which Hofmann spent in England not only saw the production on a commercial scale of mauve, the first aniline dye, by his pupil Perkin, but Hofmann's stay in England did also much to further Anglo-German chemical relations. A number of German chemists settled in England, and Hofmann, after he had returned to his native country to occupy the chair of chemistry at Berlin, brought about the foundation of the German Chemical Society on the model of the English society, with which he became familiar during his years in London. While Hofmann was in England, another German organic chemist, Kekulé, was professor in Belgium, at the University of Ghent, and there worked out his famous benzene formula; he soon afterwards returned to Germany, but yet another German, Körner, migrated permanently to Italy, where he had many pupils and died only a few years ago. Such examples of migration are most frequent in the smaller European countries whose size restricts their choice of native candidates. Moreover, in a country such as Holland every university student knows English, French and German, so that there is no difficulty about a foreigner lecturing in one of these languages until he has learned the vernacular. There are always a few Germans among the professoriate of the Dutch universities. About thirty years ago an Englishman was appointed to a theological professorship at Leiden, and when he migrated to the United States, he was succeeded by a Norwegian; in this way the Dutch government attempted to avoid the *odium theologicum* which would have resulted from the appointment of a native. Dutchmen have from time to time occupied chairs abroad; thus van't Hoff left Amsterdam for Berlin, and within recent years Holland has supplied a professor of physics to Scotland, one to Germany and a professor of medicine to Vienna. Sweden has a German professor of chemistry, and an English professor of pharmacology, who came there after holding a chair in Switzerland. This latter country is, of all, the most ready to appoint foreigners; indeed, at one time a Swiss chair was frequently a stepping-stone to a more important one in Germany. Besides quite a number of Germans I can think of one or two Frenchmen, several Poles and Russians, two Americans, an Englishman, a Dutchman and an Austrian,

who have in recent times held Swiss professorships. Such a lively interchange would however offend the nationalism of the larger countries, where there is moreover a larger choice of native candidates and where the wars of 1870 and 1914 have produced a serious setback in international exchanges.

After 1870 politics entered into science as never before. French science became national, almost insular. Germans no longer studied in Paris, and for many years no French workers came to German laboratories; by slow degrees formal relations were ultimately resumed, more readily perhaps by the victors than by the vanquished. Franco-German susceptibilities became the chief stumbling-block in any international organization, as they did in European politics. Among the most noteworthy of these organizations are various congresses at which devotees of the same branch of science meet periodically for communication and discussion of their researches. One of the oldest and most successful of these is the congress of physiologists, started in 1889 on the initiative of Michael Foster and, except during the late war, held at intervals of three years. In a gathering of this kind the very choice of a meeting place is already influenced by politics. Just as the International Postal Union and the League of Nations meet in Switzerland and the International Court of Justice in Holland, so the congress of physiology began by meeting in small countries to avoid the jealousies of the larger ones. The first six meetings were held in Switzerland, in Belgium, again in Switzerland, in England, in Italy and again in Belgium. Although Germany has important physiological laboratories, it took eighteen years for the congress to come to that country (Heidelberg, 1907). In Paris, in 1920, no Germans were present, and in 1923 at Edinburgh, the great problem was to bring the late belligerents together again. The organizer of the latter congress received strong expressions of opinion from American and English physiologists that they would welcome the presence of German and Austrian colleagues, and invitations were accordingly sent to them, but this very fact kept away many Frenchmen and Belgians. Those who were present realized, however, how the restoration to the congress of its truly international character increased its scientific value, and three years later at Stockholm, it was generally agreed that the Franco-German difficulty was at an end among the physiologists. The next meeting is to be held in 1929 at Boston, and this decision illustrates yet another problem, not political, but geographic and financial, for it will have taken the congress exactly forty years to come to America.

This is far from satisfactory. American physiologists have attended previous meetings in large numbers, they have enhanced the scientific value of the congress by their communications, yet many of them could ill afford the expenses of a journey to Europe. Of course many European university teachers are even less able to defray the cost of transatlantic travel. There is here a difficulty inherent in the spread of science over two continents. Yet it is to be hoped that, in spite of this difficulty, a numerous contingent from Europe may find it possible to accept the warm invitation of their American colleagues. Thus the visitors will be able to learn at first hand about divisions of their subject which have been developed by American pioneer work and have as yet hardly been studied on the continent of Europe.

The political difficulties in other departments of knowledge have varied. It would seem that after the war international relations were most readily resumed in those sciences which are most remote from practical considerations. Where, as in chemistry, industrial or military applications interfere, progress has been less rapid.

Thus the late war had very little effect on astronomers, but industrial rivalry and chemical warfare have delayed a *rapprochement* among the chemists. Yet here also progress may be recorded. Thus, Professor Richard Willstätter, a leader of German chemistry, who, you may recall, visited this university less than a year ago, was invited to give the Faraday lecture to the Chemical Society of London, and generously allowed himself to be reelected an honorary fellow of that society. The celebration of the Berthelot Centenary in Paris last October, the most distinguished chemical gathering in which it has been my privilege to take part, was attended by nine German and by two Austrian delegates.

Mention should also be made of the International Research Council formed as a result of meetings in London and Paris in 1918 and at Brussels in 1919. It is practically a union of academies formed for the purpose of facilitating international cooperation in scientific work, and promoting the formation of international unions in different branches of science. The statutes of the Research Council were so framed that the central powers were excluded; their inclusion immediately after the great war would indeed have been surprising. Seven years later, however, at Brussels, in 1926, the Royal Society of London, at the instigation of Holland and Denmark, proposed that the five German academies should be invited to join the International Research Council, an invitation which has not yet been accepted. Its non-acceptance must be a disappointment to the Dutch and Danish academies, and to all who wish to see science dissociated from politics. The accession of the German academies might not be very important in itself, but

it would bring with it membership of the various unions. One of these is the "Union internationale de la chimie pure et appliquée." I purposely quote its French title, for since its inception it has been largely under French influence, and at its first four annual meetings there was no question of admitting German chemists. Any one acquainted with the magnitude of the contribution which Germany has made to chemical science will realize that the union thereby greatly handicapped itself. At the sixth meeting at Bucharest in 1925, a motion was finally carried expressing the wish that the International Research Council should modify its statutes, so as to permit the entry into the affiliated unions of all countries who are members of the League of Nations. Apart from the furtherance of individual scientific intercourse, which may be secured in other ways, this entry would bring about the cooperation of the Germans in the attempt to secure a uniform chemical nomenclature, which without them is a somewhat sterile labor, since the chief exhaustive chemical dictionaries and cyclopedias have been published as the result of German enterprise and diligence. For the advance of science in general, and of chemistry in particular, it is very much to be hoped that the German academicians will accept the invitation to join the International Research Council and thereby facilitate cooperation among the younger men.

On the whole the setback in scientific intercourse produced by the late war seems to me not so great as the magnitude of the struggle might lead one to fear; the cleavage between France and Germany is no greater than it was after 1870. Moreover, we can record the beneficent effect of certain agencies which have only come into being during recent years. Thus the League of Nations, in its public health work, has incidentally brought medical men together, and from the outset German delegates have taken part. For instance, international standards have been adopted for the strength of certain drugs, and the biological methods used in testing them have formed a subject of research by pharmacologists of various nations. While this country of yours is so remote from the turmoil of European affairs that it has remained outside the League of Nations, I need hardly say that American delegates have heartily cooperated in the health work of the league, as in some other of its activities. The attitude of your government has not prevented private individuals and foundations from exercising a powerful influence in favor of the resumption of international intercourse and the furtherance of scientific cooperation. It is peculiarly appropriate that in addressing you I should record here in the first place the work of the distinguished president of this great university, who was the first chairman of the League of Red Cross Societies, at Geneva and Paris. Then I would mention the work of the Rockefeller Foundation, particularly in regard to medical education. I well remember the impression produced by a large gift to the medical school of University College, London, a few years after the war. The idealism, shown by giving so large a sum to a foreign institution, aroused feelings of enthusiasm and admiration among British men of science, and since then medical education has benefited in other countries, regardless of politics. I take pleasure in recording that the medical school with which I am myself associated has received several benefactions from the Rockefeller Foundation. Moreover, by giving traveling fellowships regardless of nationality, the foundation has done much to further scientific intercourse, particularly by enabling the younger men to visit foreign laboratories. Thus the first visitor from Central Europe to work in my laboratory after the war was enabled to do so by a Rockefeller Traveling Fellowship, and several of my pupils owe experience gained in American laboratories to the same endowment. The annual review of the work of the foundation gives an idea of its world-wide activities. Thus in 1925, in addition to taking measures for the combating of hookworm disease, yellow fever and malaria, the foundation contributed to the progress of medical education in many countries, maintained a modern medical school in Peking, provided, directly or indirectly, fellowships for 842 men and women from forty-four different countries and financed the travel of fifty other persons, officials and professors. Such activities are indeed a powerful and beneficent factor in international scientific intercourse. The International Education Board, established in 1923 by Mr. John D. Rockefeller, Jr., is an agency working in the same direction. In theory it may include the United States in its field of work. In practice, however, its interests lie mainly in other countries, since the General Education Board, founded by Mr. John D. Rockefeller, Sr., in 1902, is limited by its charter to the advancement of education in the United States. During the year 1925–1926 the International Education Board made ninety-seven first awards of fellowships and twenty-nine renewals; the holders came from twenty-five different countries. The voluntary migration of three hundred or more young scientists under the auspices of the board since its foundation provides interesting indications where, in the opinion of the European and American sponsors, the more favorable conditions for research may be found at the moment. Thus in mathematics there is a marked migration toward France, Germany and Italy, in physics the trend is definitely toward England, the United States, Denmark and Germany.

The primary object of the Rockefeller Foundation the improvement of health and of education; a valuable secondary result of their activities is the promotion of international amity. This latter object is the primary one in the case of certain other benefactions, such as that of the thirty-two scholarships for American students, founded a generation ago by an Englishman, Cecil Rhodes, in his own University of Oxford. In this, as in other matters, Rhodes was a pioneer. His foundation has now a counterpart in the Commonwealth Fund, supported by gifts from the late Mrs. Stephen V. Harkness, which fund has established a number of fellowships for British graduates, tenable at American universities. I may perhaps quote from the official memorandum: "In creating these Commonwealth Fund Fellowships the Directors of the Fund have been impelled by a belief in the value of international opportunities for education and travel to young men and women of character and ability, and by a conviction that such opportunities offered to British students will promote the mutual amity and understanding of Great Britain and the United States." The John Simon Guggenheim Memorial Foundation indirectly furthers the same object by giving fellowships to American graduates for study abroad. All these factors are bound to have a favorable effect on the outlook of the younger generation of scientific workers; half a century ago they did not exist; in the main we owe them to your country.

National characteristics have an interest, comparable to that which the student of natural history takes in the various species of animals and plants. National psychology may be as interesting as the nesting habits of birds. Each nation has its own particular genius, without which the world would be the poorer. It is interesting to inquire which nations show the greatest aptitude for scientific research, and why they do so. I feel convinced, as a result of a statistical inquiry, into which I can not enter here, that the small nations are preeminent in this respect. Per million of population Holland, Switzerland and the Scandinavian countries at present seem to contribute more to the progress of science than any of the larger nations. Why this is so it is difficult to say. It is also interesting to speculate on the reasons which make pure mathematics flourish in Italy and in Sweden, music and organic chemistry in Germany, biochemistry and psychology in the United States, physiology in Britain. Whilst we need not agree wholly with the opening words of Wurtz's dictionary of chemistry, which claims this science as French, and Lavoisier as its founder, we must recognize that we owe bacteriology to Pasteur and to France. The various nations have each their peculiar aptitude which by itself constitutes a reason for furthering international relations in science; my main reason for having brought this subject before you is, however, a desire to promote, in the words of the Commonwealth Fund Memorandum, "mutual amity and understanding." This object has already appealed to a number of your citizens; with the westward trend of civilization it is all the more desirable that the difficulties of an enfeebled Europe should be understood by America, which has become the economic mistress of the modern world, just as Rome in the third century B. C. became the political mistress of the Mediterranean. Europe, like Greece, has suffered from internal strife, yet the influence of Greece was not extinguished by the loss of political independence; the Academy survived for seven centuries, and the migration of Greek scholars began the Renaissance. Similarly, the influence of Europe will survive her economic adversity; America will doubtless become even more interested in European affairs, just as Rome looked more and more to Greek civilization.

I hope I have not wearied you with the dissensions of European men of science. In discussing them I have had in mind the words which mark so impressively the tomb of your great countryman, Grant, on the bank of the Hudson River. These words, used after a great crisis in your political history, I would apply to scientific affairs of to-day: "Let us have peace."

GEORGE BARGER

CORNELL UNIVERSITY

SCIENCE WEEK IN NEW YORK

DECEMBER 27, 1928, TO JANUARY 2, 1929

THOSE who are engaged in the preparation for the coming eighty-fifth meeting of the American Association for the Advancement of Science and Associated Societies, which will be held in New York City from December 27, 1928, to January 2, 1929, are endeavoring to arrange a week's program so attractive and interesting that the members of the association and the societies will be more than usually tempted to extend their individual visits to New York over the entire week from Thursday evening, December 27, to Wednesday evening, January 2.

With the commodious facilities afforded by several new, large, medium-priced hotels, recently constructed in the city, the local committee hopes to secure favorable weekly—and, if possible, half-weekly—rates. The American Association program will begin with the opening session on Thursday evening, December 27, and will conclude with a very interesting general address on Wednesday evening, January 2. Thus ample time will be afforded the members of the asso-

ciation and of the societies to visit personally the remarkable group of scientific institutions which have been springing up in various parts of New York City during the last twenty-five years and which have transformed the city from a merely social, economic and artistic municipality into one of the most interesting centers of scientific activity in the world. Every branch of science represented in the American Association and Associated Societies has been affected by this astonishing expansion, which, in itself, is due to the intelligence and energy of the scientific men and women who have been attracted to the city, and also to the unprecedented inflow of wealth and beneficence that has touched and enriched every branch.

In geology and geography, in physics and chemistry, in mathematics and engineering, in all the botanical and zoological sciences—including biophysics and biochemistry—finally in anthropology, psychology and education, as well as in the medical sciences, the City of New York has made wonderful progress. Its laboratories and museums, the rapidly extending exhibition halls and scientific collections connected with its leading institutions of learning and culture, are in themselves worthy of prolonged study; because many of them represent the last word in the technique of scientific research. The governing officials of all the sixty institutions where various new facilities for research and education are to be seen have united in extending a cordial welcome to the visitors who will come to New York for the approach of Science Week. It will be a great loss, especially for those coming from a distance, if their plans are made for so short a visit that they will be obliged to spend all their time in the scientific sessions, thus making it impossible or difficult to take advantage of the opportunity of accepting the hospitality of these numerous institutions. It is planned that the week's program will include one special day for each of the most interesting organizations, on which day these organizations will be specially prepared for the reception of those who are in attendance at the great science convention.

The American Museum of Natural History—with its fifty exhibition halls covering every branch of natural history and anthropology—will itself fill a great deal of the time most advantageously. Visitors will be surprised to find in this institution a finely equipped laboratory for experimental zoology and will be pleased with the beginnings of the new extension of its exhibitions and researches into other fields of biology, ichthyology and oceanography, as well as with the foundations of the future great Hall of Astronomy.

Columbia University has offered its hospitality to the association and the societies; Dean George Braxton Pegram, of the Faculty of Science, is in charge of the university's arrangements, as well as the general arrangements for the meeting, and all inquiries for meeting places—whether at Columbia, the American Museum, the Engineering Building, the Rockefeller Institute or the Cornell Medical College—should be addressed to him. Of especial interest to the members of both the association and the societies are the superb buildings erected in the various departments of science since the association last met at Columbia, in 1916. Foremost among these buildings is the new Chemistry Hall, planned under the direction of the late Professor Charles F. Chandler and embodying all the newest ideas in the construction of a chemistry building, both for practical and experimental laboratories, and the encouragement of various branches of research. It is expected that many of the sections of the association and the societies associated with it will find ample accommodation in the numerous lecture halls and laboratories of the university. The adjacent Teachers College, with its large auditoriums and lecture halls will especially welcome the various meetings devoted to education; while Barnard College, Horace Mann School, International House and Casa Italiana, on the university grounds, stand ready to open hospitable halls. The New York Historical Society, adjacent to the American Museum, offers further accommodations at that part of town, while the medical and engineering sections will be magnificently provided for.

Special efforts are being made to have the scientific sessions of the association and the societies distributed as satisfactorily as possible in Science Week. It is hoped that the majority of the society meetings may not be crowded into the first half-week (December 27 to 29) but that many of the societies will arrange to hold their meetings, receptions and dinners from Sunday, December 30 to Wednesday, January 2, the date on which the last general session of the American Association will be held, followed by the closing general reception.

Evening addresses of general interest in the several science fields are being planned for every evening of the week, which are to be announced later. These will be delivered in the great Hall of the American Museum of Natural History (77th St., and Central Park West) and each is to be followed by a reception for those interested in the field of science represented by the address. The receptions will be held in the new education hall of the museum and the appropriate exhibition halls will be open during the evening, with special arrangements of exhibits planned particularly for these occasions.

Registration offices for the convention will be in education hall at the museum, also at Columbia University, where many of the scientific sessions are to

be held, and probably at the Engineering Societies Building (29 West 39th St.) and at Cornell Medical College (28th St. and Avenue A). Arrangements are in progress by which those who register may be subject to just as little inconvenience as possible, especially with reference to the validation of reduced-rate railway certificates and other features of registration. These arrangements will be announced later from the Washington office of Dr. Burton E. Livingston, permanent secretary of the association, in the Smithsonian Institution Building.

The local arrangements for meeting places and equipment and for the general sessions, receptions, etc., are, as usual, in the hands of the local committees for the meeting, with a local executive committee consisting of the following members, as thus far appointed:

Henry Fairfield Osborn, president of the American Association.

Michael I. Pupin, honorary chairman of the local committee.

George Braxton Pegram, general chairman of the local committees.

J. McKeen Cattell, chairman of the executive committee of the American Association and editor of SCIENCE.

Sam F. Trelease, secretary of the local committees.

Communications regarding arrangements for the meeting should be addressed to Dr. Sam F. Trelease, secretary, American Association office, American Museum of Natural History, West 77th St., New York City, and a copy of each communication should be simultaneously sent also to Dr. Burton E. Livingston, permanent secretary, American Association for the Advancement of Science, Smithsonian Institution Building, Washington, D. C.

The chief purpose of the newly elected president is to make the coming eighty-fifth meeting of real scientific significance in the advancement of science in this country, as is done, year by year, in the splendidly organized meetings of the British Association for the Advancement of Science. Accordingly, invitations are being sent to the leading scientific representatives of New York, Princeton and New Haven, to serve as members of local advisory committees for the several sections of the Association and their associated societies. Names of the members of these advisory committees will be published in the near future. It is hoped that they will lend their influence and scientific prestige to the meeting and aid in making the New York programs much more valuable than usual.

The president is also suggesting to the vice-presidents for the sections that they choose for their addresses subjects of current popular interest, and that they prepare their manuscripts, with summaries, well in advance, so that these may be released to the press in distant cities on the respective days when the addresses are delivered.

It fortunately happens that many of the most distinguished men of American science are going to be in New York during this Science Week, so the principal general addresses will be very important. The plan of extending an invitation abroad to at least one great public lecturer is also under consideration. Another very important feature of the coming meeting will be the symposia on topics of present interest, some of which may be suggested by the president of the association. It is, moreover, eminently desirable that the section officers and the officers of the associated societies join forces in avoiding conflicts of program so as to successfully amplify each other.

Later issues of SCIENCE will contain further announcements of preparations for this really notable event in American scientific history.

HENRY FAIRFIELD OSBORN,
President of the American Association for the Advancement of Science.

WALTER LE CONTE STEVENS

WALTER LE CONTE STEVENS was born in Gordon County, Georgia, on June 17, 1847.

His early education was obtained from tutors in his father's home and from local private schools near Walthourville. He entered the University School at Athens in 1862 and studied there for two years. During this time, though only sixteen years of age, he taught Latin and Greek in addition to his regular work as a student.

In 1864 he entered the Confederate army and was stationed with the field artillery at Fort McAllister, Georgia. He was transferred to the Signal Corps and served as a telegraph operator until stricken by malaria. He spent most of his time while a soldier as an invalid.

He entered the University of South Carolina in 1866, just as that institution was changing from a college to a university, and received the degree of A.B. in 1868. His graduating essay was on "Physics and Metaphysics," showing, in spite of almost exclusively classical training, a leaning toward scientific subjects. This leaning was, no doubt, fostered by his early association with his father, who was a country physician, and with his uncles, the famous Le Conte brothers.

After graduation he clerked for a short time in a drug store in Columbia and he tutored and taught

in local schools for about two years. It was during this time that his first paper, "Mutes and Liquids," appeared in *The Virginia Educational Journal.*

He was elected professor of chemistry and modern languages in Oglethorpe College and he spent the year of 1870–71 at the University of Virginia studying chemistry. After Oglethorpe College was closed in 1873 he taught science in the high schools of Savannah, Georgia, until 1876. In 1876–77 he again attended the University of Virginia, this time studying mathematics.

Feeling that his chances for further development were small in the south he went to New York in 1878 and taught as a special lecturer for five years, attending night classes at Cooper Union. He spent much of his spare time in research on binocular perspective during this period. Several papers on this and related subjects appeared at about this time. Largely as a result of this work, the University of Georgia granted him an honorary Ph.D. in 1882.

He was elected professor of physics (and of course many other things as well) in the Packer Collegiate Institute in Brooklyn in 1882, which position he held until 1890. During this professorship he published a number of articles on sound. On resigning this position Dr. Stevens spent about two years in Europe, studying in Strassburg, Berlin and Zurich, returning to America in 1892 to accept a professorship of physics at the Rensselaer Polytechnic Institute.

In 1892 he was elected secretary of Section B of the American Association for the Advancement of Science and in 1894 he became vice-president of this section.

He came to Washington and Lee University in 1898 as McCormick professor of physics, which position he held until his retirement as emeritus professor in 1922.

His training and experience were broad and his interests were many. Music was his chief delight and he accumulated a most unusual library of graphophone records. He wrote many essays on cultural as well as scientific subjects, and his condensed reviews of operatic librettos were of the greatest interest and use to his friends.

His death in Lexington, Virginia, on December 28, 1927, removed one of the few remaining scientists of the old school. He was an accurate thinker and a powerful teacher, and his personality showed a most pleasing blend of classical polish and scientific precision. He never allowed himself to specialize, but remained broad in tastes and interests. He felt that all the fields of physics were his own.

His long life of hard work and valuable accomplishment was ended quietly and peacefully in his home in Lexington, and his interest in current happenings and affairs continued practically to the end.

He is survived by his wife, Mrs. Virginia Lee Letcher Stevens, of Lexington, Virginia, and by his brother, J. Percy Stevens, of Atlanta, Georgia.

BENJAMIN ALLEN WOOTEN

SCIENTIFIC EVENTS

PROPOSED MEMORIAL TO THE LATE PROFESSORS SIR WILLIAM M. BAYLISS AND ERNEST H. STARLING

A COMMITTEE has been formed to raise funds wherewith to commemorate the work of the late Professors Sir William M. Bayliss and Ernest H. Starling. This committee has issued the following memorandum:

The opinion has been frequently and widely expressed that some fitting memorial should be made to record the great services rendered, both to the science of physiology and to its applications in the practical problems of medicine, by the labors of Bayliss and Starling, who were intimately connected for so many fruitful years. That they contributed greatly to the progress of physiology is too well recognized to need emphasis. The patient zeal of the one, the fire and enthusiasm of the other and the eagerness of both on all occasions to place their knowledge and experience at the disposal of other workers from any part of the world, have led to a universal appreciation of their services. The number of individuals in all countries who have profited directly from their help or indirectly by their influence is very great, and their writings stand as monuments to their industry and learning.

A committee, the constitution of which is given below, has been formed to issue an appeal for funds wherewith to commemorate the connection with physiology of these great partners in a manner of which they themselves would have approved: a material memorial or an annual lecture would have seemed a smaller thing to them than the provision of means whereby young workers of suitable training and ability might be attracted into their chosen subject. The committee, therefore, is of opinion that the most fitting memorial would be the creation at University College of a Bayliss and Starling studentship, open to any graduate in science of any university, or any graduate or undergraduate in medicine of suitable standing, to enable him to spend a year or more in such training in physiology and biochemistry as would fit him for research. A small part of the funds collected might be employed in the erection of a simple memorial tablet in the entrance hall of the Institute of Physiology.

Subscriptions may be sent to Professor Lovatt Evans at the Institute of Physiology, University College, Gower Street, London.

Members of the Committee: Professor J. Barcroft, Cambridge; Samuel Bayliss, Wolverhampton; Sir J. Rose Bradford, president of the Royal College of Physicians; Professor W. B. Cannon, Harvard Medical School; Professor E. P. Cathcart, Glasgow; Dr.

H. H. Dale, National Institute for Medical Research; Professor J. C. Drummond, University College, London; Professor C. Lovatt Evans, University College, London; Dr. J. Fawcett, Guy's Hospital; Sir Gregory Foster, provost of University College, London; Sir J. Kingston Fowler, London; Professor A. V. Hill, Foulerton professor, Royal Society; Sir F. G. Hopkins, Cambridge; Professor J. B. Leathes, Sheffield; Sir T. Lewis, University College Hospital, London; Professor Graham Lusk, Cornell Medical College, New York; Professor Sir C. J. Martin, director, Lister Institute; Professor M. S. Pembrey, Guy's Hospital Medical School; Professor Sir E. Sharpey-Shafer, Edinburgh; Sir C. Sherrington, Oxford; Professor G. Elliot Smith, University College, London; Dr. Hubert Starling, Norwich; Professor J. F. Stenning, warden of Wadham College.

THE YALE SCHOOL OF FORESTRY

THE Yale School of Forestry has announced certain changes in policy designed to strengthen its course of study and broaden the opportunities for work of an advanced and specialized character. These changes involve first a modification of the requirements for the degree of master of forestry, second the recognition of forestry by the graduate school of the university as an appropriate field of study for the degree of doctor of philosophy and third the enlargement and enrichment of the courses offered in a number of subjects. The new educational policy aims to provide, as formerly, a training for the general practice of forestry and, in addition, to afford special opportunities for the advanced student who desires to specialize in some branch of forestry. This will strengthen the present curriculum and enable the school to fulfil its fundamental objective of offering to the individual student a type of training which best meets his special educational needs. Under the new plan the requirements for the degree of master of forestry include: two years' work in technical forestry, one year of which must be in residence at Yale; a thesis representing work of an individual character, and an examination covering the general field of forestry.

The degree of doctor of philosophy is conferred by the graduate school of the university. The work of the student is under the direction of the faculty of forestry of the graduate school, which includes the professors of the school of forestry giving instruction in the graduate school and representatives from other departments whose work is affiliated with forestry.

A number of the courses offered by the school will be enlarged and made more comprehensive. The former plan of a prescribed curriculum necessitated the curtailment of certain courses in order that each student might be able to cover the field of forestry in a specified period of time. In consequence these courses could not be given with the degree of thoroughness compatible with sound education.

Of special importance is the extension of work in soils. Through a cooperative arrangement with the Connecticut Agricultural Experiment Station, the school has secured the services of Mr. M. Francis Morgan to conduct the instruction in this subject. He will offer a foundation course especially designed for forestry students and also will direct the work of advanced students.

The course in forest entomology will also be enlarged. The instruction in this subject will be given by Dr. Roger Boynton Friend. He will offer a foundational course in entomology and direct the work of those specializing in forest entomology.

Larger opportunities for the graduate student will be afforded in the fields of forest products, forest policy, economics and forest pathology.

INCREASE OF SALARIES AT COLUMBIA UNIVERSITY

A RISE in salaries of teachers and administration officers of Columbia University, effective on July 1, has been authorized by the board of trustees. The increases will affect all the 450 members of the teaching and administrative staff appointed directly by the trustees for full-time service, except for two small groups for whom provision has already been made, either by special salary rises or by appropriations in the 1928–29 budget.

The new salary schedule will increase the present minimum scale for full professors to $7,500 a year, instead of $6,000 as heretofore, and will provide three groups—one at $9,000, one at $10,000 and one at $12,000—to which individual professors of exceptional service or distinction may be advanced or appointed. Sixty-eight professors have now been placed in these groups.

The new normal minimum for associate professors will be $5,000, instead of $4,500, with a $6,000 classification for individuals of exceptional service or distinction, fifteen having already been placed in this category.

Assistant professors will receive a normal minimum of $3,600, instead of $3,000 as heretofore, and there will be groups at $4,000, $4,500 and $5,000 for those of exceptional distinction or service. Fifty are already allotted to these groups.

The new minimum for instructors has been set at $2,400, replacing the old minimum of $2,000, with advancement in the following years, if reappointed, to $2,700 and $3,000. Additional compensation has been provided also for fourteen officers of the univer-

sity administration, seventeen members of the library staff and five members of the business administration. The new schedule will not apply to services given in the summer session or in extension work.

Remarking that the action of the trustees was consistent with a liberal policy adopted as far back as 1875, President Butler said:

> They have now, through their careful husbanding of the university's resources, and by reason of recent benefactions, been able to take action which will add greatly to the satisfaction and material rewards of academic service at Columbia University. It is greatly hoped that this action will set an example to be followed at other institutions to the well-deserved advantage and comfort of the great body of American scholars engaged in the world of university teaching and research.

AMERICAN MEDICAL ASSOCIATION GRANTS FOR RESEARCH

THE committee on scientific research of the American Medical Association has made a grant of $250 to Dr. O. Larsell, of the University of Oregon Medical School, Portland, in aid of his studies on the hemopoietic effect of nuclear extractives.

Dr. A. A. Maximow, professor of anatomy at the University of Chicago, has received $1,000 from the association for paying skilled technical help.

Dr. G. A. Talbert and his collaborators of the physiological department of the University of North Dakota have received a third grant of $300 for continuing the research on the "Constituents Common to the Sweat, Urine and Blood."

A substantial grant has been made to the department of agricultural chemistry of the University of Wisconsin for a quantitative study of the distribution in foodstuffs of copper which, from recent researches in that department, is now known to supplement iron in the building of hemoglobin in the mammal.

SCIENTIFIC NOTES AND NEWS

DR. WILLIAM D. HARKINS, professor of chemistry at the University of Chicago, has been awarded the Willard Gibbs gold medal of the Chicago section of the American Chemical Society.

THE Louis Edward Levy medal of the Franklin Institute of Philadelphia has been awarded to Dr. Vannevar Bush, professor of electric power transmission at the Massachusetts Institute of Technology, for two papers on the Product Integraph, a mathematical instrument developed under Dr. Bush's direction. The medal will be presented at the annual medal day exercises of the Franklin Institute on May 16.

AT the annual general meeting of the Institute of Chemistry, held on March 1, the Meldola medal for 1927 was presented to Dr. J. H. Quastel, fellow of Trinity College, Cambridge.

THE editors of the *Journal de Mathématiques* announce that the volumes for 1928 and 1929 will be dedicated to the eminent mathematicians Paul Appell and Émile Picard, as a tribute upon the occasion of their scientific jubilees. The edition will be limited and the volumes will not be reprinted.

DR. WEBER, professor in the University of Geneva, presided over the Congress of the Anatomists' Association which opened on April 3 in Prague. The vice-president is Dr. J. P. Hill, professor of embryology in the University of London.

WALDEMAR KAEMPFFERT, of New York, the editorial and scientific writer, has been appointed director of the Rosenwald Industrial Museum, Chicago.

PROFESSOR DR. C. RAMSAUER, director of the Physical Institute of the Technical High School of Danzig, Germany, has been appointed head of the new research laboratory which the Allgemeine Elektricitäts Gesellschaft is establishing in Berlin.

DR. GEORGE T. PACK, for five years professor and head of the department of pathology, University of Alabama School of Medicine, has accepted an appointment at the Memorial Hospital for Malignant Diseases, New York.

DR. B. YOUNGBLOOD has resigned as director of the Texas Agricultural Experiment Station, effective on April 30, to continue the development of the cotton utilization research program of the U. S. Bureau of Agricultural Economics. He is succeeded as director of the station by A. B. Conner, who has been connected with the Texas station since 1904, as agronomist, vice-director and acting director.

EDGAR S. ROSS, senior fellow at the Mellon Institute, has resigned to become manager of research and development for the Headly Good Roads Company of Philadelphia.

DR. GEORGE T. MOORE, director of the Missouri Botanical Garden, is making an extended trip abroad during which he will visit the leading botanical gardens and experiment stations of Europe, as well as the principal bulb and orchid growers.

PROFESSOR AND MRS. T. D. A. COCKERELL have left Siam for Australia after conference with Dr. Kerr on the Siamese flora and with Dr. Hugh M. Smith on Siamese fishes.

DR. WILLIAM H. F. ADDISON, of the University of Pennsylvania, who has been at the Instituto Cajal, Madrid, for the past two months, will go to London about the first of May to attend the Harvey tercentenary celebration.

DR. H. A. GLEASON, of the New York Botanical Garden, sailed on March 22 for Europe, where he will devote the ensuing six months to a continuation of his studies on the plant life of British Guiana. His work will be done mainly at the Royal Botanic Gardens, Kew, England, where the most important collections of Guiana plants are conserved.

DR. THOMAS A. JAGGAR, seismologist of the United States Geological Survey in charge of the Hawaiian Volcano Observatory, has left Washington to head the National Geographic Society's expedition to explore the Mount Pavlof sector of the Alaskan peninsula and Aleutian Islands volcanic chain.

ERNEST G. HOLT will head an expedition to South America to study bird life, which is being organized under the auspices of the Carnegie Museum and the National Geographic Society.

T. H. C. TAYLOR, entomologist of the Department of Agriculture of Fiji, recently visited the fruit-fly laboratory of the U. S. Bureau of Entomology at Ancon, Canal Zone, on his way from Trinidad to Fiji.

ACCORDING to the *Electrical World*, P. A. Maximov, president of the Soviet Electrotechnical Trust, has arrived in this country, accompanied by B. I. Bukhovtsev, production manager of the trust, to make a study of the electrical industry.

HARRY A. CURTIS, professor of chemical engineering at Yale University, sailed on April 11 as a representative of the U. S. Department of Agriculture to the International Nitrogen Conference which begins April 30. This is the conference to be held aboard the North German Lloyd steamer *Lutzow* in the Adriatic. Dr. Curtis expects to return early in June.

DR. SOLOMON KATZENELLENBOGEN, former chief resident physician at the Hospital Canton, Geneva, Switzerland, and lecturer in internal medicine at the University of Geneva, has arrived in Baltimore to take over his new duties as associate professor in psychiatry at the Johns Hopkins University School of Medicine.

DR. SERGIUS MORGULIS, professor of biochemistry in the University of Nebraska College of Medicine, has been invited to deliver the introductory lecture at the meeting of the congress of the Gesellschaft für Verdauungs- und Stoffwechselkrankheiten. The congress will hold its session in Amsterdam from September 12 to 15.

PROFESSOR SAMUEL J. BARNETT, of the physics department of the University of California at Los Angeles, has been selected to deliver the fourth annual research lecture at the university on April 20. His subject will be "The Elementary Magnet as a Spinning Top" and will be a popular treatment of the subject of gyro-magnetic phenomenon.

DR. COLIN G. FINK, head of the division of electrochemistry of Columbia University, has addressed the Maryland section of the American Chemical Society on "Corrosion, its Prevention and the Restoration of Ancient Bronzes."

D. MCFARLAN MOORE, of the Edison Lamp Works, recently addressed the chemical engineering students of Columbia University on "Neon and the Electric Conduction of Gases."

DR. W. W. LEPESCHKIN, professor of plant physiology, University of Prague, Czechoslovakia, will give an address at the Michigan State College on April 20, under the auspices of the Phi Sigma Society. The subject of the address is "Colloidal State of Substances as a Necessary Condition of Life."

PROFESSOR JAMES FRANCK, of the University of Göttingen, Germany, recently gave at Cornell University a series of five lectures on "Quantum Jumps of Electrons."

PROFESSOR BRUNO BLOCH, director of the dermatological clinic of the University of Zurich at Strasbourg, lectured at the Harvard Medical School on April 16. His subject was "Formation of Pigment in the Skin."

UNDER the joint auspices of the University of Chicago and the Institute of Medicine, the third John M. Dodson lecture of the Rush Alumni Association was given on April 16, at the University of Chicago clinics, by George Barger, professor of biologic chemistry, University of Edinburgh, on "The Thyroid Hormone."

ISAAC PHILLIPS ROBERTS, emeritus professor of agriculture in Cornell University and formerly dean of the College of Agriculture, died on March 17 at Palo Alto, California, in his ninety-fifth year.

THE ninth annual meeting of the Southwestern division of the American Association for the Advancement of Science will be held in conjunction with the first special joint meeting of the Pacific division at Flagstaff, Arizona, from April 23 to 26, inclusive. A feature of the meeting will be the attendance and participation in the programs of a number of members of the Pacific division. Under tentative plans each division will designate the regular annual meeting of the other as a special meeting of its own.

THE fifth annual meeting of the West Virginia Academy of Science will be held on May 18 and 19 at Davis and Elkins College, Elkins, West Virginia. On Friday evening an illustrated lecture on "South America and its Mineral Resources" will be given by Dr. Benjamin L. Miller, professor of geology in Lehigh University. The sections of the academy are: Biology, chemistry, geology and mining, mathematics and physics and social science. Dr. John L. Tilton, professor of geology in West Virginia University, is the president of the academy.

THE North Dakota Academy of Science will hold its twentieth annual meeting at the North Dakota Agricultural College, Fargo, on May 4 and 5. Dr. H. L. Walster, dean of agriculture at the North Dakota Agricultural College and agronomist at the experiment station, will preside. Professor J. Arthur Harris, head of the botany department of the University of Minnesota, will make the invitation address on the topic "The Biological Application of Practical Agricultural Experimentation."

THE Rocky Mountain Section of the Mathematical Association of America will meet at the Colorado School of Mines on April 20 and 21. The outside speaker will be Dr. E. B. Stouffer, dean of the graduate school and professor of mathematics at the University of Kansas.

THE fifty-seventh annual meeting of the American Public Health Association will be held in Chicago, from October 15 to 19, with headquarters at Hotel Stevens. The American Child Health Association and the American Social Hygiene Association will meet with this organization. Dr. Louis E. Schmidt is chairman of the local committee and Arthur E. Gorman is secretary. Sessions are being arranged for health officers, child hygienists, public-health nurses, laboratory technicians, vital statisticians, health education directors, food and drug experts, industrial hygienists and public-health engineers.

THE sixteenth annual meeting of the Eugenics Research Association will be held at the American Museum of Natural History in New York City on Saturday, June 2. This will be a joint meeting of the Eugenics Research Association and the American Eugenics Society.

DR. MARK H. INGRAHAM, associate secretary of the American Mathematical Society, writes that the society held its spring meeting in the west at the University of Chicago on April 6 and 7. The attendance was about 120, including approximately 100 members. There were 49 papers presented to the society: 15 in geometry, 7 in applied mathematics, 10 in algebra and 17 in analysis. On Friday afternoon Professors E. B. Stouffer and E. P. Lane gave symposium addresses on "Recent Developments in Projective Differential Geometry." At the dinner held Friday evening Professor L. E. Dickson was presented with the first award of the Frank Nelson Cole prize. This was presented for his book "Algebren und ihre Zahlentheorie" and other works. These works are a continuation of the work in linear algebras for which he was presented with the thousand-dollar prize at the meeting of the American Association for the Advancement of Science in Cincinnati.

A CONFERENCE on the improvement of hard spring wheat was held at Fargo, North Dakota, on March 27, at the North Dakota Agricultural College, with Dr. J. L. Coulter, president of the institution, presiding. The aim of the conference was to discuss the development of wheats more resistant to disease, especially to stem rust, and possessing better quality. There were sixty-five in attendance at the conference. Addresses were made by plant breeders, plant pathologists and agronomists, and by men representing commercial interests. In addition to the addresses, committees were appointed to formulate a program of wheat improvement, to discuss the organization and cooperation of the program and the financing of it. The conference adjourned after having elected Dr. J. L. Coulter, *president;* Dr. Andrew Boss, *vice-president,* and Dr. L. R. Waldron, *secretary-treasurer,* and after appointing a program committee of eighteen and a finance committee of five.

A CONFERENCE on industrial gas and coke heat was recently held at the Mason laboratory of mechanical engineering at Yale University, under the auspices of the mechanical engineering department, cooperating with the Manufacturers' Association of Connecticut. Over two hundred and fifty engineering executives attended, from not only Connecticut, but from other eastern states. This was the second of a series of similar meetings on heat and heat treating inaugurated by the university and the Manufacturers' Association as a service to Connecticut industries, the first conference dealing with electrical heat-treating.

THE United States Civil Service Commission announces competitive examinations for men for biochemist (soil fertility), $3,800 to $5,000; associate soil technologist, $3,000 to $3,600, and assistant soil technologist, $2,400 to $3,000. Applications for these positions must be on file with the commission at Washington, D. C., not later than May 8. The examinations are to fill vacancies in the Bureau of Chemistry and Soils, Department of Agriculture, for duty in Washington, D. C., or in the field.

IT is announced by Dr. Howard McClenahan, secretary of the Franklin Institute, that the institute now

has money and property in hand amounting to $2,000,000, which it proposes to apply toward building on the Parkway a great museum of industry and physical science.

ENDOWMENT of $7,000,000 is being sought for the Engineering Foundation and the Engineering Societies Library, according to an announcement by the board of trustees of the United Engineering Society, representing the national societies of civil, mining and metallurgical, mechanical and electrical engineers. One fund of $5,000,000, it is planned, will be applied to the research projects of the foundation, and a second fund of $2,000,000 to the maintenance of the library. The foundation was established thirteen years ago with a gift of $500,000 from Ambrose Swasey, engineer and manufacturer of Cleveland, Ohio. This amount has been increased to about $625,000.

AN appropriation of $300 each year for a period of five years for the International Society for the Exploration of the Arctic Regions by Means of the Airship (see SCIENCE for April 6, page 363) will be recommended to the House by the Committee on Foreign Affairs. The committee, on March 31, voted a favorable report on the Porter resolution, designed to carry out the recommendations of President Coolidge on the subject. The 19 nations which are expected to contribute to the work of the society, of which Fridtjof Nansen is the president, are: Bulgaria, Denmark, Germany, England, Estonia, Finland, France, Italy, Japan, Latvia, the Netherlands, Norway, Austria, Sweden, Switzerland, Spain, Czechoslovakia, Russia and the United States.

THE final closing of a contract with the Amarillo Oil Company, of Amarillo, Texas, which, it is thought, will greatly increase the available supply of helium required for the operation of dirigibles, is announced by the U. S. Bureau of Mines. Under the terms of the contract, the bureau will undertake the extraction of the helium from natural gas from the company's leases on the Cliffside Structure in Potter County, Texas, at a new helium plant to be constructed by the government at Amarillo.

PURCHASE of a property at 135 North 19th Street, which will complete the site for the proposed building group of the Franklin Institute, was approved at a meeting of the institute on March 15. Henry Howson, senior vice-president of the institute, announced that the purchase gave that body title to the entire plot, 288 by 110 feet, along 19th Street, between Cherry and Race Streets. At the lecture which followed the meeting a report on the work of the Bartol Research Laboratories was submitted by Dr. W. F. G. Swann, director. Dr. Swann discussed the more important researches which have been completed or are being carried on at this time.

THE Canadian correspondent of *Engineering and Industrial Chemistry* writes that the Dominion Government will proceed during 1928 with the establishment of National Research Laboratories for Canada at Ottawa. In the government estimates for the year, just made public by the minister of finance, the sum of $750,000 is provided for the construction of the first unit of a series of laboratories for the conduct of industrial research and the determination of standards. This combines, in a way, the functions of such institutions as the Bureau of Standards at Washington and Mellon Institute of Industrial Research at Pittsburgh. The project has been under consideration for several years. With the necessary money voted for a building and equipment, the National Research Council will be able to make definite progress this year. Two other items in the government estimates are of interest to chemists. In the Mines Department appropriations, there is the sum of $12,000 for the Explosives Division for organization and equipment purposes, and there is another item—$50,000—for new laboratories in connection with the Fuel Testing Division. There are also increased appropriations for dairying, feed and fertilizer control and experimental farms. Canada's main estimates for the year are $373,796,856, an increase of $7,725,542 over the total provided for the current fiscal year. Supplementary estimates will be tabled towards the close of the parliamentary session.

THE Russian Academy of Sciences has decided to organize a joint expedition with German scientists for the purpose of exploring the Pamir. Among the members of the expedition will be geologists, meteorologists, botanists, geographers, etc. The Academy of Sciences will be represented in the expedition by Professor Korzhenevsky, of Tashkent University, the geologist Stcherbakov, and Professor Belayev, while the Germans will include Professor Ficker, of the Berlin Meteorological Institute, the geologist Rickmers and others. The expedition is to take place in May.

THE request of the Stoll-McCracken expedition for permission to explore northeast Siberia and study mammals and birds has been approved by the All Union Society for Cultural Relations. Members of the expedition include Harold McCracken, associate editor of *Field and Stream;* Dr. H. E. Anthony, mammalogist of the American Museum of Natural History; Charles H. Stoll, New York financier; John Burnham, president of the American Game Protection Association; Carl Fredericks, president of the Campfire Club of America; George Potter, taxidermist, and

Mrs. Charles H. Stoll, photographer. The party proposes, after exploring Alaska and the Aleutian Islands, to arrive at Petropavlovsk, Kamchatka, on June 1, on board the ship *Morrissey*, commanded by Captain Bartlett. After Kamchatka the party will proceed to the Gulf of Anadir and then through Bering Strait to the mouth of the Kolymia River.

ACCORDING to *Industrial and Engineering Chemistry*, invitations have been received by the executives of large American chemical companies to attend an international nitrogen conference in the Adriatic, beginning April 30. The invitations were issued by the following, who comprise the largest nitrogen producers of Europe: Comptoir Français de l'Azote, Paris; Montecatini Societa Generale, Milan; Nitram, Ltd., London; Norsk Hydroelektrisk Kvaelstofaktieselskab, Oslo, and Stickstoff-Syndikat, G. M. B. H., Berlin. The scope and objects of the meeting will be to put on record the knowledge which has been gained since the conference held at Biarritz last year in regard to fertilizers in their relation to agriculture and to afford opportunity for discussion. Papers will be presented by J. Bueb, F. C. O. Speyer, L. Bretigniere, H. Warmbold, Sir Frederick Keeble, A. Demolon, Erwin Baur, H. J. Paige, T. H. J. Carroll and J. Galland.

UNIVERSITY AND EDUCATIONAL NOTES

THE cornerstone of the William H. Welch medical library at the Johns Hopkins University School of Medicine has been laid by the president of the university, Dr. Frank J. Goodnow, who placed in the stone a copper box containing correspondence between Dr. Welch, the university and the General Education Board, whose financial help made the library possible.

IMMEDIATE construction of a new chemistry building to cost $350,000 has been authorized by the board of trustees of the University of New Hampshire. The establishment of a department of agricultural economics in charge of M. Gale Eastman has also been authorized.

THE *Journal* of the American Medical Association records the appointment of Dr. Stuart Graves, of Louisville, Ky., as dean of the school of medicine of the University of Alabama to succeed Dr. Clyde Brooks, who has been appointed chairman of a newly created faculty committee on research, for which the last legislature made a special appropriation. The appointment of Dr. Graves is said to be the first step in a program to establish a four-year medical course at the university.

PROFESSOR A. B. COBLE, of the Johns Hopkins University, recently accepted a professorship of mathematics at the University of Illinois, where he had been prior to the present academic year.

DR. WILLIAM W. WATSON, assistant professor of physics at the University of Chicago, has been appointed assistant professor of physics at Yale University.

AT Princeton University, Dr. Herman Weyl, professor of high mathematics at the Eidenossischen Technischen Hochschule in Zurich, Switzerland, has been appointed to the Thomas D. Jones research professorship of mathematical physics. The following three members of the department of mathematics have been promoted from associate professor to full professor: James Waddell Alexander, Solomon Lefschetz and Joseph H. M. Wedderburn.

IN place of the existing department of philosophy and psychology at University College, London, a department of philosophy and a department of psychology have been instituted. Professor C. E. Spearman, now Grote professor of philosophy of mind and logic, will be head of the department of psychology, his title being changed to professor of psychology in the University of London.

DR. WERNER HEISENBERG, of the University of Copenhagen, has been appointed professor of theoretical physics at the University of Leipzig.

DR. DEBEYRE has been appointed successor to the late Professor Lanesse in the chair of histology at the University of Lille.

DISCUSSION AND CORRESPONDENCE

THE APPEARANCE OF INSTABILITY OF CONDENSED SUBSTANCES NEAR THE ABSOLUTE ZERO OF TEMPERATURE

IN a previous article in SCIENCE,[1] the writer called attention to the possibility of condensed substances becoming unstable and exploding under a high pressure at or near the absolute zero of temperature, and mentioned that *white* tin should behave in this manner. The criterion for the existence of such an instability is that if from external evidence it appears that the controllable internal energy of a substance can not lie below a certain value, and this can not be accounted for by integration of the specific heat down to the absolute zero of temperature, the substance

[1] LXVII, 1725, p. 69, 1928.

must become unstable at or near this zero and explode. Thus, for example, the heats of formation of mols of the substances H_2O, CH_4, NH_4 and CO_2 in the gaseous state from the elements C (graphite), H_2, O_2, N_2 are about 57,880, 18,300, 9,500 and 97,000 cal's, respectively, at room temperature. These heat energies are derived from the internal energies of the elements, which, if no instability occurs, are given by the integration of the specific heats down to the absolute zero of temperature with the final state being solid. But the internal energies of the foregoing elements obtained in this way by the writer (May number of the *J. Franklin Inst.*) are 45, 1,100, 2,980, 3,090 cal's, respectively, and are thus not sufficiently large to account for the heats of formation. It was also shown in this paper that the temperature at which instability begins is always above the absolute zero. Thus one of the elements of each of the foregoing compounds becomes unstable at a low temperature. But since the heat of formation of a compound is not likely to be derived from the internal energy of one of its elements only, each of the foregoing elements very probably becomes unstable at a certain temperature. Thus frozen solid masses of these elements in interstellar space are likely to explode when their temperatures have fallen below certain values.

If an external pressure is applied to such a substance to prevent the explosion, and the substance is then allowed to expand doing external work, a state will eventually be reached at which the pressure and the internal energy is zero.[2] The substance is now a modification of the original substance. In the case of *white* tin we have already seen that the modified form is *gray* tin. Such modifications at low temperatures of the elements mentioned should exist, but at present they are not known. The vapors of such elements in interstellar space near the absolute zero of temperature would tend to condense into the stable modifications, but the process would take place almost infinitely slowly.

R. D. KLEEMAN

SCHENECTADY, N. Y.

ETHYLENE IS A RIPENER OF FRUITS AND VEGETABLES

IN an article published in the *Journal of Industrial and Engineering Chemistry* (Vol. 19, p. 1135, 1927), Chace and Church decry the "wide publicity of the alleged ripening effect" of ethylene on certain green fruits. They state that the treatment of green bananas with ethylene in a concentration of 1–5,000 produced no acceleration of color or respiration increase, in opposition to the data which I have reported. It should be noticed that Chace and Church and Denny recommended concentrations less than 1 part of ethylene to 5,000 of air in the coloration of citrus fruits, whereas I have recommended 1 to 1,000 for the ripening of fruits at temperatures above 65° F. Chace and Church report no effect of ethylene upon the ripening of dates, and state there occurred "no material difference in composition between the treated and untreated fruits" of lemon. Denny had previously reported a marked action on the stimulation of respiration in lemons under ethylene treatment to produce coloration. It seems unreasonable that the respiration can increase and still produce no effect on composition of the fruits. The data reported by the authors simply show that these workers in the U. S. Department of Agriculture do not know the proper conditions for ripening fruits with ethylene.

An editorial in the *Scientific American* hastens to state that "the investigations carried out by Messrs. Chace and Church tend to disprove Dr. Harvey's conclusions." The statement that "these investigators have carefully studied the effect of ethylene on citrus fruits, dates, persimmons, bananas, tomatoes, pomegranates and avocadoes and find that while the color of the fruit is affected, none of the changes ordinarily connected with ripening are observable" is unjustified even by the article referred to. The effect of these publications is to bring under suspicion unjustly the process of ripening fruits with ethylene gas, a process which has been successfully used by hundreds of fruit jobbers to produce quicker ripening and a product of superior flavor.

The statement by Chace and Church that the use of ethylene on persimmons "will be of no use to the grower because they could not be shipped after ripening" is not to the point, for every fruit jobber knows the advantage of shipping fruits in the firm condition. The difficulty of ripening such fruits after shipment has been removed by the discovery of this process whereby they may be quickly ripened at destination. We should be able now to import fruits from the tropics which were not available before.

The ripening effect of ethylene on fruits and vegetables can be demonstrated easily by any one who is willing to carry out the simple instructions for the process, namely: the green fruit should be put into a reasonably tight chamber, the temperature should be preferably at 65° F. but may be higher in some cases, and the concentration of ethylene should be established at 1 cu. ft. for each 1,000 cu. ft. of air space. The gas may be renewed each day. The fruit should be so packed into the space that there is free air circulation and an abundant supply of oxygen to care for a rate of respiration which is much increased.

[2] *J. Phys. Chem.*, 31, 1669–1673, 1927.

Ethylene causes an increased rate of digestion of starch, which may make fruits sweeter, it causes changes in the cell wall materials just as in ripening fruits, it causes the disappearance of tannins and of organic acids to some degree, and increases protein cleavage. These same changes when occurring in fruits on the tree may be taken as evidences of ripening.

The work of E. M. Harvey, J. T. Rosa, R. P. Hibbard, W. A. Gardiner, and others than the parties to this controversy has proven that ethylene and some related compounds have remarkable effect on stimulating enzyme actions. These compounds act as coenzymes, if such a blanket term is permitted, for the hydrolytic enzymes and may act as hydrolytic catalysts themselves according to data by Rhea and Mullinix. The triple bond as in acetylene has a different action from the double bond of ethylene and propylene. The addition of elements at the double bond seems to destroy the action, except in some compounds which may yield ethylene. The formation of the oxide from ethylene destroys the effect. One is inclined to wonder if this catalytic action on hydrolyses is not a function of the double bond which may take on hydrogen and hydroxyl ions and again yield them easily to anhydrides. The surface tension effects, solubility in aqueous and lipoid phases, as well as the low molecular weight may give these double bond compounds properties not possessed by other such compounds found in plants.

I had been asked by two journals which have published articles in this controversy to write articles for them on the ethylene process. The data of value for commercial application had already been published sufficiently, and explicitly. I can see no reason why one should be required to publish before he is ready to do so. Charles Darwin would have had a slim chance of accumulating data for eighteen years if he had lived under our present system of reporting scientific results.

R. B. HARVEY

CAMBRIDGE, ENGLAND

BANANA STOWAWAYS

IN reference to the note of Mr. L. A. Adams in SCIENCE of February 24, 1928, it may be of interest to record that in the summer of 1909 a laborer engaged in carrying bananas from a refrigerator car to a warehouse in Madison, Wisconsin, was terrified by having an animal leap from a bunch he had just placed on his shoulder, and attack his throat. The creature was captured and brought to our laboratory. It proved to be a female Marmosa, probably *M. murina*, and carried a litter of young on her back. The whole family was kept alive for some days, but eventually died of malnutrition. Twice in the last twelve years we have received specimens of a small boa snake, taken from banana bunches, one at Madison, and one at St. Croix Falls, Wisconsin.

GEORGE WAGNER

UNIVERSITY OF WISCONSIN

UNDER the above caption in SCIENCE for February 24, L. A. Adams mentions the finding of opossums of some species of the genus Marmosa in a bunch of bananas at Urbana, Ill.

I have in my collection two specimens of small opossums, each taken in Colorado Springs. One is *Marmosa cinerea,* and was found in a bunch of bananas about August 2, 1905. I saw an account of the capture in a local paper and secured the animal, keeping it alive for several days. Like Mr. Adams' animals it ate grasshoppers as well as other food. I was told that when caught it had a young one clinging to it, but that had disappeared before the animal came into my possession. The specimen was a female.

The other example, *Marmosa zeledoni,* is a skin given me by C. E. Aiken, October 5, 1912. He told me the animal was given him in the flesh by a man who had killed it in a commission warehouse, thinking that it was a rat. The type locality of this species is Navarro, Costa Rica, and doubtless the animal reached here with bananas. Both of these specimens were identified by the Bureau of the Biological Survey.

If my memory does not play me false, Victor Borcherdt, of Denver, told me that he had known of several instances of small tropical opossums being found in bananas in the city.

EDWARD R. WARREN

COLORADO SPRINGS, COLO.

GALILEI OR GALILEO?

WOULD it not be time to call the great Italian by his right name? He is always referred to as *Galileo.* But *Galileo* was his given name, while *Galilei* was his family name. The French and Germans have always referred to him as *Galilei.* Of course the objection will be made that this is a paltry matter and that the usage *Galileo* is time honored. Still it is wrong. How would it do, if we referred to noted men bearing the names William Williams or Samuel Samuels as William or Samuel?

A. KAMPMEIER

DAVENPORT, IOWA

CONTRIBUTIONS ASKED FOR MEMORIAL TO LAPLACE

FROM the Philosophical Society of Washington, accompanying its subscription to the fund for the erec-

tion of a monument to the memory of the illustrious Laplace, comes the suggestion that a place should be requested for the publication in SCIENCE of the aspiration on the part of the Municipal Council of Beaumont-en-Auge, where Laplace was born, to proceed with the project formed before the World War to erect a memorial to Pierre Simon Laplace, author of "La Mécanique Céleste" and "L'Exposition du Système du Monde."

A committee has been organized in France of the most distinguished members of the Academy of Sciences and affiliated bodies, whose resolve to make the intended monument an international tribute, worthy of the universal service performed by Laplace in the advancement of civilization, extends a call to scientists and scientific bodies of the United States, as well as those of other foreign countries, to hear this appeal for contributions toward the sum of $3,000 which has been apportioned to be raised here.

Checks drawn to the order of Monsieur Pierre Leger, treasurer of the Committee of Initiative, Paris, and sent to Monsieur Maxime Mongendre, Consul-General of France in New York, at 9 East Fortieth Street, New York City, will be forwarded to M. Leger.

G. W. LITTLEHALES

HYDROGRAPHIC OFFICE,
WASHINGTON, D. C.

SCIENTIFIC BOOKS

Flora of the Panama Canal Zone. By PAUL C. STANDLEY. Contribution U. S. Nat. Herbarium. Vol. 27. 1928.

STANDLEY has published a very important contribution to our knowledge of the flora of the Panama Canal region. In 1921 the governor of the Canal Zone asked the assistance of the Department of Agriculture in the preparation of an illustrated flora of the region. Standley was selected to prepare the flora, and the results of his investigations are now published. The purpose of the investigation was not only to contribute to our scientific knowledge of the region, but also to develop our knowledge of tropical agriculture. Some idea of the method of presentation may be obtained from the statement that "with the aid of the many English and Spanish common names, it should not be difficult for the casual visitor to identify most of the important plants of the Canal Zone."

The flowering plants of the region number about two thousand species. Besides the native plants, the keys include also the cultivated plants. The work is based on the collections of the United States National Herbarium, which for many years has been receiving a wealth of material from collectors. Standley himself visited the Canal Zone twice, studying the flora and making collections. He gave special attention to the common names in use and also to the local uses of plants. The publication, therefore, is not merely a taxonomic account of the flora, but includes also much material of more general interest.

An interesting account is given of the contrasts in physiography and flora of the Atlantic and Pacific slopes. About two thirds of the Canal Zone lies on the Atlantic slope and has a highly diversified flora, very little of the pioneer vegetation remaining. The Pacific slope is comparatively arid, and the vegetation is very different in type from that of the Atlantic slope. This difference in the two floras consists not only in the general appearance, but also in the genera and species represented. The most conspicuous element of the Atlantic slope flora is the great number and variety of palms. The author also includes a very interesting account of the history of botany exploration in Panama. In short, the publication assembles in a single volume all the available information in reference to the development of our knowledge of a very interesting region. It will also make possible to appreciate and investigate more intelligently the closeness of the relationship of this flora to that of South America. The sixty-six remarkably fine plates picture some of the outstanding features of the flora.

Only about fifty pages are taken up with the general presentation of the region, its history and its outstanding features. The bulk of the volume is made up of the taxonomic presentation of the flora. It is not written in ordinary taxonomic style, but presents the taxonomic facts in simpler and more readable form. Detailed descriptions are not given, but there are keys for identification that will help the taxonomist. These keys include not only the native or naturalized species, but most of the introduced plants grown for ornament or for economic purposes. In the case of the more important plants, those likely to prove of the greatest interest to the public, more extensive accounts are given which will assist in recognizing the species. It is not a rigidly taxonomic work in the usual sense, therefore, but a general introduction to the flora of an interesting region, which may be of service not only to botanists, but also to all who may be interested in the region.

JOHN M. COULTER

BOYCE THOMPSON INSTITUTE

SPECIAL ARTICLES

VITAMINS A, D AND E AND THE OXIDATION OF FATS AND OILS

THE potency of oils and fats in vitamin deficiency work is closely related to their unsaturation. Evans and Burr[1] have shown that the compound concerned in vitamin E contains double bonds; and Hess and coworkers,[2] Rosenheim and Webster[3] and Holtz[4] have shown that the compound concerned in vitamin D formation is associated with ergosterol—a triunsaturated sterol. Vitamin A is known to be similar to some degree in this respect.

Beyond the knowledge of association of unsaturation with the vitamins little is known. Nothing is known concerning the activating mechanism. The works of Mattill,[5] Hess and coworkers,[2] Anderegg and Nelson,[6] Evans and Burr[7] and others show, however, that oxidation is a serious factor in vitamin destruction. This is of natural consequence since when active oxidation begins in the oil or fat the unsaturated compounds associated with vitamin activity, like all the unsaturated compounds present, would themselves be involved.

Irradiation catalyzes autoxidation[8] and hence promotes the onset of the active oxidation period. However, with irradiation, active oxidation does not begin immediately but passes through an induction period during which there is practically no oxygen absorption.[8] One must not assume, however, that during this period no reaction occurs. Some reaction must occur to increase the oxidizing intensity to the point where the double bonds are attacked, and then active autoxidation begins.

The ease with which fats are attacked depends upon the type of unsaturated compound present as well as upon the presence of compounds containing hydroxy groups.[8] Ergosterol, a highly unsaturated compound, should respond readily to any treatment tending to alter its susceptibility to oxidation. Cholesterol, on the other hand, is very resistant to oxidation and responds to irradiation only when this treatment is prolonged at higher temperatures.[9]

The induction period is of special interest in susceptibility studies and from the author's point of view should be of interest to workers in the field of nutrition. Irradiation shortens the induction period,[8] or increases susceptibility to oxidation, and during this irradiation the vitamin D content increases. Prolonged irradiation induces active oxidation with simultaneous destruction of vitamins A, D and E.

A correlation of published data of work in nutrition and fat oxidation suggests that vitamin D and perhaps also vitamins A and E may be closely allied with changes occurring to vary susceptibilities to oxidation, or, in other words, may be allied with intermediate oxidation reactions. If slight oxidation is involved it should be possible to obtain vitamin D activity with other unsaturated compounds very similar in their chemical nature to ergosterol and stabilized by the presence of hydroxy groups, but as heretofore suggested irradiation would have to be adjusted to the stability of the compounds to oxidation.

Rosenheim and Webster[3] assert that the OH group is necessary to the mechanism concerned in vitamin D formation. It seems unnecessary to assume at present that it actually enters into combination to form the active (vitamin) compound. Unsaturated compounds containing OH groups (ricinoleic acid) oxidize slowly[8] and it is probable that the action of these groups is merely one of retarding the oxidation which destroys the "vitamin." The hydroxy groups may, therefore, be present as part of the compound concerned or as a constituent group of another compound. The latter case seems to have been shown by the experiments of Mattill,[5] who postulates also that the OH group is perhaps an important constituent of a fat in the prevention of the destruction of vitamins A and E by oxidation.

Another explanation of protection seems possible. If the constituents of an admixed oil or fat oxidize at a lower intensity level than do the compounds responsible for vitamin activity, it seems probable that oxidation may in some cases, especially those wherein water is present, proceed to some extent without involving the "vitamin" parent substance.

That *vitamins are labile states and not stable entities* seems to follow from a consideration of their properties. *Oxidation may, however, be involved in their formation.* Hart, Steenbock, Kleitzein and Scott's[10] experiments upon vitamin D may bear directly upon this point. Corn oil and the non-saponifiable fraction of cod-liver oil, neither potent when fed to goats, showed potency when mixed and fed.

Irradiation may be viewed as a promoter of oxidation and the extent to which it can be carried depends

[1] Evans, H. M., and Burr, G. O., Univ. of California Memoir No. 8 (1927).

[2] Hess, A. F., *J. Am. Med. Assn.*, 1927, LXXXIX, 337.

[3] Rosenheim, O., and Webster, T. A., *Biochem. J.*, 1927, XXI, 389.

[4] Holtz, F., *Klin. Wochenschr.*, 1927, VI, 535.

[5] Mattill, H. A., *J. Am. Med. Assn.*, 1927, LXXXIX, 1505.

[6] Anderegg, L. T., and Nelson, V. E., *Ind. and Eng. Chem.*, 1926, XVIII, 620.

[7] Evans, H. M., and Burr, G. O., *J. Am. Med. Assn.*, 1927, LXXXIX, 1587.

upon the resistance of the oil used to oxidation. Irradiation in vacuum must be carefully controlled in order to yield infallible results. Few oils are entirely free from loosely bound oxygen and even after exhaustive evacuation at low pressures they contain enough oxygen to autoxidize actively when sealed in vacuum.[8] Ethyl ether, due to the presence of peroxides, is not a safe reagent to use in work upon vitamins. Water and alcohols have a protective action to autoxidation[11, 12] and have been shown to have a protective action upon vitamins in diets.[6]

In view of vitamin destruction through oxidation the practice of administering materials to be tested admixed with easily oxidizable oils is apt to yield inconsistent and unreliable results.

GEORGE E. HOLM

BUREAU OF DAIRY INDUSTRY,
U. S. DEPARTMENT OF AGRICULTURE

MODIFICATIONS IN CHILODON UNCINATUS PRODUCED BY ULTRA-VIOLET LIGHT

USING a Cooper-Hewitt mercury vapor quartz lamp, run on three and a half amperes, rapidly dividing and conjugating cultures of *Chilodon uncinatus* were exposed to ultra-violet light. The distance from the light to the top of the cultures was twenty-two centimeters. The cultures were exposed for two minutes at intervals of two and three days, depending upon the state of the cultures. There were eight exposures in all.

One ex-conjugant, not fully reorganized, was used to start a culture, and eight subcultures were made from this, two being used as controls, and six exposed to ultra-violet light.

In five of the cultures, no important changes were observed. In the sixth, a culture in which an epidemic of conjugation was occurring at the time of the last two exposures, many abnormalities were found, and three distinctly different types of animals.

(1) The normal *Chilodon uncinatus*. This type has four chromosomes in the diploid count, easily determined during conjugation. The controls show this same number.

(2) A larger animal having the same features as the controls, but which, when isolated and cultivated, was found to have eight chromosomes. This has been checked up through three conjugation epidemics. The form is, therefore, a tetraploid form.

(3) The third type of animal is very different from the other two, as it shows characteristics of both *C. uncinatus* and *C. cucullulus*. The macronucleus has moved from the posterior end of the animal to the middle. In appearance, this macronucleus is much more like that of *C. cucullulus* than *C. uncinatus*, the shape being elliptical, and the portion surrounding the endosome is much less granular. The micronucleus, as in *C. cucullulus*, is not in the posterior portion of the macronucleus, but on the left side near the anterior end.

One vacuole has changed position. In *C. uncinatus*, there is a vacuole on the left side near the margin at the anterior end, and one on the right side near the margin about one fourth of the distance from the posterior end. In the new form, this last vacuole has moved to the posterior end in the center.

The pharyngeal basket is shorter, and is more anterior. The average number of trichites seems to be twelve.

In general shape, the animal looks more like *C. cucullulus*, but the ciliation is more like *C. uncinatus*, the only difference being that here the usual short marginal rows are a little longer than in the original.

Though this animal has been kept alive in pure cultures since the last week of August, 1927, it has never conjugated. In cultures where the animals are fairly abundant, encystment has occurred regularly, the whole culture sometimes encysting within a few hours. The length of time elapsing before animals are recovered from the cysts is very variable. Seven days is the shortest time in which they have been observed to emerge, and three to four weeks is more usual.

A more detailed description, with figures, will appear in a later paper.

MARY STUART MACDOUGALL

AGNES SCOTT COLLEGE

[8] Holm, G. E., Greenbank, G. R., and Deysher, E. F., *Ind. and Eng. Chem.*, 1927, XIX, 156.

[9] Striteskey, J., *Biochem. Z.*, 1927, CLXXXVII, 388.

[10] Hart, E. B., Steenbock, H., Kleitzein, S. W., and Scott, H., *J. Biol. Chem.*, 1927, LXXI, 271.

[11] Holm, G. E., and Greenbank, G. R., Proc. World's Dairy Congress, 1923, II, 1253.

[12] Greenbank, G. R., and Holm, G. E., *Ind. and Eng. Chem.*, 1924, XVI, 598.

THE NATIONAL ACADEMY OF SCIENCES

THE National Academy of Sciences will hold its annual meeting in Washington on April 23 and 24. The following papers will be presented:

MONDAY, APRIL 23

Morning, 10:00

WILLIAM DUANE: *X-radiation from Mercury Vapor* (illustrated).

EDWIN H. HALL: *Electron Free Path and Supra-conductivity in Metals* (illustrated).

W. A. NOYES: *Reactions of Compounds having Odd Electrons; Nitric Oxide and Nitrogen Trichloride.*

R. M. LANGER and GERALDINE K. WALKER (introduced by

George K. Burgess): *Models of the Schrödinger Atom* (illustrated).

E. O. HULBERT (introduced by J. S. Ames): *Ionization in the Upper Atmosphere of the Earth* (illustrated).

C. J. DAVISSON and L. H. GERMER (introduced by F. B. Jewett): *Reflection and Refraction of Electrons by a Crystal of Nickel* (illustrated).

LEON BRILLOUIN (introduced by C. E. Mendenhall): *A Possible Direct Experimental Test of the Existence of the Spinning Electron* (illustrated).

EDWIN H. HALL: *Comments on Sommerfeld's Electron Theory of Metals.*

FRANK WENNER (introduced by George K. Burgess): *A Seismometer Employing Electromagnetic and Optical Magnification and Electromagnetic Damping* (illustrated).

WALTER S. ADAMS and HENRY NORRIS RUSSELL: *Preliminary Results of a New Method for the Analysis of Stellar Spectra* (illustrated).

W. H. WRIGHT: *Photography of the Planets, Saturn, Jupiter, Mars and Venus, by Light of Different Colors* (illustrated).

Afternoon, 2:00

R. C. GIBBS and H. E. WHITE (introduced by Ernest Merritt): *Some Recently Discovered Spectroscopic Relationships* (illustrated).

R. W. WOOD: *Recent Results of the Fluorescence of Iodine and Mercury Vapor with Especial Reference to the Infra-red* (illustrated).

R. W. WOOD and R. CANFIELD: *Exhibition of Echelette Diffraction Grating in the Infra-red* (illustrated).

W. F. DURAND: *New Methods for Treating the Problem of the Surge Chamber* (illustrated).

ELMER A. SPERRY: *The Reaction of the Gyroscope to the Rotation of the Earth, and the Relative Value of the Gyro as a Torque Producer* (illustrated).

GEORGE F. MCEWEN (introduced by T. Wayland Vaughan): *An Analysis of Temperature Changes in Lake Mendota regarded as Effects of Penetrating Radiation, Surface Loss of Heat and Turbulence* (illustrated).

MARSHALL A. HOWE: *Algae as Reef-builders and Land-formers* (illustrated).

DAVID WHITE: *Algal Deposits of Unkar Proterozoic Age in the Grand Canyon, Arizona* (illustrated).

HENRY S. WASHINGTON: *The Bearing of the Pacific Lavas on the Question of the Atlantic and Pacific Rock Clans.*

EDWARD KASNER: *Geodesic Families of Curves.*

FRANCIS D. MURNAGHAN (introduced by J. S. Ames): *On a Symmetrical Presentation of Dynamical Theory* (illustrated).

Evening, 8:15, in the Central Hall

JAMES FRANCK (by invitation): *Molecular Collisions* (illustrated).

I. S. BOWEN (by invitation): *The Story of Nebulium* (illustrated).

R. A. MILLIKAN: *The Origin of the Cosmic Rays* (illustrated).

Following these addresses, to which the members of the scientific societies of Washington are invited, the rooms adjacent to the central hall will be open for the inspection of scientific exhibits.

TUESDAY, APRIL 24

Morning, 9:00

WILLIAM TRELEASE: *Biographical Memoir of Charles Sprague Sargent.* (To be read by title.)

ALEŠ HRDLIČKA: *Traces of Prehistoric Man in Alaska* (with demonstration of specimens).

TRUMAN G. YUNCKER (introduced by William Trelease): *A Monograph of the Genus Cuscuta.*

CHARLES P. BERKEY: *Evidences of Changes of Climate in the Gobi Region of Central Asia* (illustrated).

JAMES W. GIDLEY (introduced by C. G. Abbot): *Additional Evidence on Pleistocene Man in Florida* (illustrated).

H. L. SHANTZ (introduced by L. O. Howard): *World Vegetation and Potential Agricultural Land* (illustrated).

S. A. COURTIS (introduced by Raymond Pearl): *The Factors Determining Growth* (illustrated).

FRANCIS G. BENEDICT and G. D. WILLIAMS: *The Racial Factor in Basal Metabolism: a Study of Maya Indians in Yucatan* (illustrated).

J. C. WALKER (introduced by L. R. Jones): *Inheritance of Fusarium-resistance in Brassica oleracea* (illustrated).

WALTER T. SWINGLE (introduced by R. A. Harper): *Metazenia in the Date Palm, Possibly a Hormone Action Exerted by the Endosperm* (illustrated).

JOHN M. ARTHUR (introduced by John M. Coulter): *Plant Growth in Artificial Climates* (illustrated).

H. J. MULLER (by invitation): *The Production of Mutations by X-rays* (illustrated).

HENRY FAIRFIELD OSBORN: *Recent Discoveries Relating to the Tertiary Ancestry of Man* (illustrated).

Afternoon, 2:00

E. H. MORRIS (introduced by W. H. Holmes): *Discovery of Extraordinary Turquoise Mosaic in the Buried Temple at Chichen Itza, Yucatan* (illustrated).

W. J. V. OSTERHOUT and E. S. HARRIS: *Positive and Negative Currents of Injury* (illustrated).

HENRY H. DONALDSON: *A Study of the Brains of Three Scholars* (illustrated).

GEORGE W. CRILE (introduced by Dayton C. Miller): *An Interpretation of Excitation, Exhaustion and Death in Terms of Physical Constants* (illustrated).

L. A. ROGERS and E. O. WHITTIER (introduced by Ludwig Hektoen): *The Limitation of Population in Bacterial Cultures* (illustrated).

C. R. STOCKARD: *Type Hybrids in Dogs and Development of Female Genitalia in Male Individuals* (illustrated).

CHARLES F. CRAIG (introduced by W. G. McCallum): *Observations upon Complement Fixation in Infections with Endamoeba hystolytica* (illustrated).

H. M. JOHNSON (introduced by Aleš Hrdlička): *The So-called "Depth of Sleep"* (illustrated).

SCIENCE NEWS

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THE MEANING OF EVOLUTION

"THE meaning of evolution is probably more misunderstood than any doctrine of science. The misunderstanding has arisen from ignorance of the subject, from misinterpretation of the statements of scientific men, and from what may be called a medieval attitude of mind. It has been a shock to educators to realize that there still remains such a mass of untrained minds that can be imposed upon by eloquent ignorance."

With these sentences Professor John M. Coulter, of the Boyce Thompson Institute, Yonkers, N. Y., and formerly head of the botany department at the University of Chicago, opened his lecture March 31, at the New York Botanical Garden.

Opponents of evolution who state that the doctrine has been cast aside by scientists are either self-deceived or deliberately deceiving others according to Professor Coulter. What is being cast aside is not the idea of evolution itself, but many of the formerly accepted explanations of how it came about. Evolution becomes more firmly entrenched every day in the minds of scientists as new facts continue to accumulate, but while these new facts make the probability of the evolutionary process ever stronger, they are themselves so many and present such complicated problems that the question of how evolution happens becomes ever more difficult to answer.

The teaching that acquired characters can sometimes be inherited, long denied, is now beginning to find friends again, Professor Coulter stated. This doctrine of evolution was advanced by Lamarck, long before Darwin's time, but seemed to have been shoved aside by Darwin's alternative doctrine of constant, small, spontaneous variations acted upon by the process of natural selection. The force of natural selection is still admitted, at least in part, but the usefulness of small variations has been called in question by many biologists.

The mutation theory of DeVries, which substitutes sudden origins of new forms at a single leap for the slow variations conceived by Darwin, is still widely accepted, but doubts have been thrown on its validity in many instances, and even its own author has accepted some cases of apparent mutations as being due to the sorting out of hybrid characters.

Yet in spite of all doubts and questions as to method, the fact of evolution remains unshaken, the speaker declared. With evolution, the living world is a single unified picture; without it, creation is chaos, and no single fact has any necessary relation to any other fact.

In conclusion, Professor Coulter cited the great practical value which the study of evolution has had in its applications to the bread-and-butter problem of agriculture.

The statement was made that during the ten years preceding the great war our population had increased twenty per cent. and our food production about one per cent. It was certainly an alarming outlook. Under these circumstances plant crops began to be studied from the standpoint of genetics, and plant breeding became a science.

The lack of crop production arose chiefly from three causes, namely, lack of adaptation of crops to environment, destruction by drought, and destruction by disease. The same races of plants were being cultivated everywhere, and only in certain places was the maximum result obtained. A study of races of crop plants throughout the world, and of the environment necessary for maximum yield, resulted in such an adjustment of crops to conditions that total food production was enormously increased.

The problem of drought is being rapidly solved by the discovery or development of drought resistant races, not only insuring against loss from this cause, but also enormously increasing the possible area of cultivation.

The problem of disease has been attacked in the same way, and disease resistant races of most of the important crops have been developed, much reducing loss from this source.

As a result, food production is now beginning to overtake population, and we may thank the persistent study of evolution for the result.

ANCIENT MAN IN AMERICA

DR. ALEŠ HRDLIČKA, of the U. S. National Museum, expresses serious doubt as to the high antiquity of the hupresses serious doubt as to the high antiquity of the human inhabitation of America, in spite of such evidence as the recent finding of arrow-heads and human bones in Florida, apparently associated with the remains of animals that lived during the Ice Age.

Dr. Hrdlička is not as inclined to place great emphasis on finding human and animal remains in the same strata as are the paleontologists, or scientists who study ancient animal life. Except for accidental introductions, man alone, among all the forms of animate existence, has the custom of burying his dead; and this must often have introduced his bones, and the tools placed with them as funeral gifts, into strata containing the remains of animals that died many thousands of years earlier. And it is not always possible, he says, to tell whether or not the overlying earth has been dug out and then shoveled back in.

Another point is that, because an animal is extinct, it is not necessarily ancient; it may have lived up to a few thousands of years ago and been a contemporary of the earlier American man, without thereby making the latter very ancient.

A further difficulty, from the anthropologists' point of view, is that so very few of these supposedly ancient human remains and implements have been found in America, as contrasted with the literally millions of flints, bones and similar objects showing human handiwork, together with scores of human skulls and skeletons that have been found in the old Stone Age caves and

sites of Europe. Although experienced anthropologists have been working for many years among the cliff and cave dwellings in the Southwest and elsewhere, they have not found underlying these comparatively recent structures a single implement or a bone of either human being or animal that would indicate the presence of a paleolithic race on this continent.

Another weighty point advanced by Dr. Hrdlička is that the European deposits show a more or less orderly evolution of human skill, from the earliest rough-chipped flints to the perfected stone implements that just preceded the use of metals, whereas the American finds, even those associated with the bones of extinct animals, are all of culturally far advanced types. But the same is true of all the American skeletal remains of man claimed to be ancient—they are all of modern types. This would mean that while man was developing both culturally and in bodily characteristics from the earliest to modern forms in Europe, here in America he started at the top and made no progress at all. And Dr. Hrdlička considers this highly improbable.

AVIATION HAZARDS

FLYING is becoming safer. Aviation accidents, in proportion to the mileage flown throughout the whole United States, are diminishing, according to statistics compiled by Dr. Frederick L. Hoffman, consulting statistician of the Prudential Life Insurance Company.

During the year 1926, there were 160 fatal accidents in air operations, including pilots, mechanics, passengers and others. Five of these were women, one a negress, a professional aviatrix. The number was probably somewhat less during 1927, while the air mileage during the year increased considerably.

It is estimated that in 1927 there were about 1,500 licensed pilots, among whom there occurred 11 fatalities, a rate of about 7 per 1,000. Even if the rate were 10 per 1,000 it could not be considered excessive considering the novelty of flying over new air routes and the rapid growth of the industry.

Dr. Hoffman is making a comprehensive survey of aviation hazards in this country and abroad to determine among other things what percentage of aviators die, and what constitute the primary factors in aviation accidents. In the course of his investigations, statistics of military, mail and commercial aviation have been consulted, while personal flights have been made to the extent of over 10,000 air miles in this country, Canada and Europe.

The Imperial Airways of London during the three years ending with 1927 carried about 52,000 passengers without a fatality. The air mileage flown was not quite 2,500,000 and, as stated, without a single death to mar the record. By the way of contrast Dr. Hoffman pointed out that in 1842, according to the London *Times*, the number of passengers carried on the eight railway lines of the United Kingdom numbered 10,000, while the distance traveled was 3,500,000 miles. The number of passengers killed that year was 22. Yet air transportation has vastly greater difficulties to contend with.

This summer Dr. Hoffman expects to fly from Boston to the Pacific Coast and return by the southwestern route, giving special attention to airports, radio reporting, plane and engine performance, comfort, safety and medical examination of pilots. The trip will extend over about 6,000 miles of established airways.

A STATISTICAL SURVEY OF THE INCIDENCE OF CANCER

"IF, in some manner or other, malignant tumors of the alimentary tract and of the reproductive organs could be prevented, cancer would retire at once to a relatively unimportant place among the causes of death."

This statement was made by Dr. Raymond Pearl, director of the Institute of Biological Research of the Johns Hopkins University, after the completion of a statistical survey, made by himself and Miss Agnes Latimer Bacon, on necropsies performed on fatal cancer cases in the Johns Hopkins Hospital.

In summarizing the results of the survey, a report of which will appear in a forthcoming issue of the *Archives of Pathology*, he stated that in men malignant tumors occurred more frequently than anywhere else in the organs of digestion, such as the stomach, intestines, gall bladder and liver. In the women the cancers were found in the reproductive organs. These conditions are in general agreement with the cancer figures of the U. S. Census Bureau.

"The greatest discrepancy between the general population and the necropsy statistics is in respect cancer of the skin," added Dr. Pearl. "Patients with cancer of the skin die at home rather than in a hospital relatively more frequently than do patients with cancer of any other organ system. This fact means that such cases tend to the under-represented in necropsy statistics. The patient who enters a hospital with cancer of the skin in an early stage is discharged cured. But for the patient who lets his cancer of the skin go without treatment, or with the supposedly palliative treatment of quackery, until it is destined shortly to be fatal, a hospital has little to offer."

From these studies it appears that more of the different organ systems of the body are susceptible to cancer in white people than in colored. On the other hand, a relatively larger proportion of the cancers of colored people occur in the digestive system and in the reproductive system than is the case in whites. The average age at death of people with tumors that had produced secondary growths or metastases, as they are known to medicine, was found to be from one to three years earlier than in cancer cases without such secondary growths.

HAY FEVER

THE spring hay-fever season is officially started. Maple and elm trees, oaks, hickories, and walnuts have announced the open season for sneezing by broadcasting their pollen on the April air. And in return the first faint hay-fever sneezes have promptly been set off.

Spring hay fever, caused by the pollen from trees, is less likely to be recognized than the summer hay-fever due to weeds and grasses, according to Dr. Harry S. Bernton, associate professor of preventive medicine of the Georgetown University Medical School. Many people who start sneezing about this time of year attribute their symptoms to colds due to the fickle changes of spring weather.

Hope for some of the baffling cases of hay fever due to grass pollen is held out this year by Dr. Bernton, through new analyses of the pollen grains. It has been customary to find out the kind of pollen that irritates the nasal tissues of each hay-fever victim, and then to treat the patient with injections of that particular pollen extract until he becomes immune. Recently by analyzing the pollen, it has been found that a person may be sensitive to one substance in a grain of pollen and not to the rest of the material packed in the tiny grain. Some cases that have stubbornly resisted treatment are due entirely to a sensitiveness to the albumen fraction in the pollen. Albumen makes up only about one ninth of the extractable protein in the pollen grain. So when these patients were treated with pollen extract they did not get big enough doses of albumen to help them. This year, Dr. Bernton is reinforcing the extract of albumen to see if these puzzling patients can be rendered sneeze-proof.

Foresighted sufferers from summer hay-fever are now having the usual pollen injections to render their noses invulnerable by the time the summer pollens get on the air. The newer method of having injections twice a month throughout the year, instead of taking a steady series of treatments before each hay-fever season, is slowly gaining favor. This method seems to produce a more permanent immunity to the disease, but the average hay-fever sufferer likes to forget his sensitive nose entirely in the months when he can breathe freely.

THE USE OF GOAT SERUM TO PREVENT MEASLES

WHEN measles broke out in the children's ward of the Cook County Hospital, Dr. Louis J. Halpern, resident physician, undertook to stem the disease with goat serum first developed by Dr. Ruth Tunnicliff, of the John McCormick Institute for Infectious Diseases of Chicago.

This serum is produced by immunizing goats by means of cultures of a coccus which Dr. Tunnicliff believes to be the causative germ of measles. It has been used on a previous occasion to prevent measles but only with a small number of cases.

Fifty children, ranging in age from a few weeks to twelve years old, who had never had measles before were treated with the serum, said Dr. Halpern in a report to the American Medical Association. Five of the young patients were ruled out of the series by death from the diseases from which they were suffering when admitted to the hospital. None of these, however, developed measles or showed any signs of serum sickness.

Of the remaining 45, 28, or 63 per cent. were successfully protected, while 17 developed the disease, but the majority of these experienced it only in an attenuated form. None of the children suffered from the after complications that make measles a severe menace to very young children.

As a result of this experience, it seems evident that goat serum gives efficient protection in a large number of cases and offers the advantage of being more readily available than human convalescent serum, which has seen considerable application for the same purpose, since it can be produced in quantities to meet all necessary demands.

ITEMS

"ASTRONAUTICS" is the latest name to be introduced for a branch of science. It has recently been adopted by the French Astronomical Society to indicate the problems of voyaging through space to other heavenly bodies. To encourage development of this new "science" the society has been given funds for an annual prize of 5,000 francs (about $200) to be awarded in 1928, 1929 and 1930 to the "author of the best original work capable of bringing a realization of one of the numerous scientific desiderata tending to the final goal of astronautics," namely, of actually traveling from the earth to another celestial body. The funds for the prize have been donated by Robert Esnault-Pelterie and André Hirsch, and is known as the Rep-Hirsch prize. It is under the control of a committee of leading French astronomers and physicists, including General Ferrie, former president of the society and head of the telegraphic system of the French army; Professor Jean Perrin, Nobel prize winner in physics; Professor Charles Fabry, director of the Optical Institute; Professor Henri Deslandres, director of the Paris Observatory, and others.

AN example of evolutionary effects in a breed of domestic poultry originally noticed by Darwin, the white-faced Spanish fowl, has gone on evolving rapidly under the guidance of artificial selection, according to a British student of poultry, F. Finn, who writes in *Nature*. When Darwin knew the breed, Mr. Finn states, its face and the sides of its head were covered with white skin, and its earlobes were prominent and pendulous. This white skin has developed even more extensively during the half-century since Darwin called attention to the birds, and the earlobes have vanished as such, having been merged in a sort of horizontal delap that hangs across the cock's throat.

A PLANT that generates gas which can be lighted with a match is described in the British scientific journal, *Nature*, by Dr. W. A. Hamor, assistant director of the Mellon Institute of Industrial Research, of Pittsburgh. The plant is known botanically as *Dictamnus albus*, and in common speech as dittany; it grows in southern Europe and central Asia. It is covered with glands that secrete a volatile oil, which in hot weather apparently evaporates, making the air about the plant inflammable.